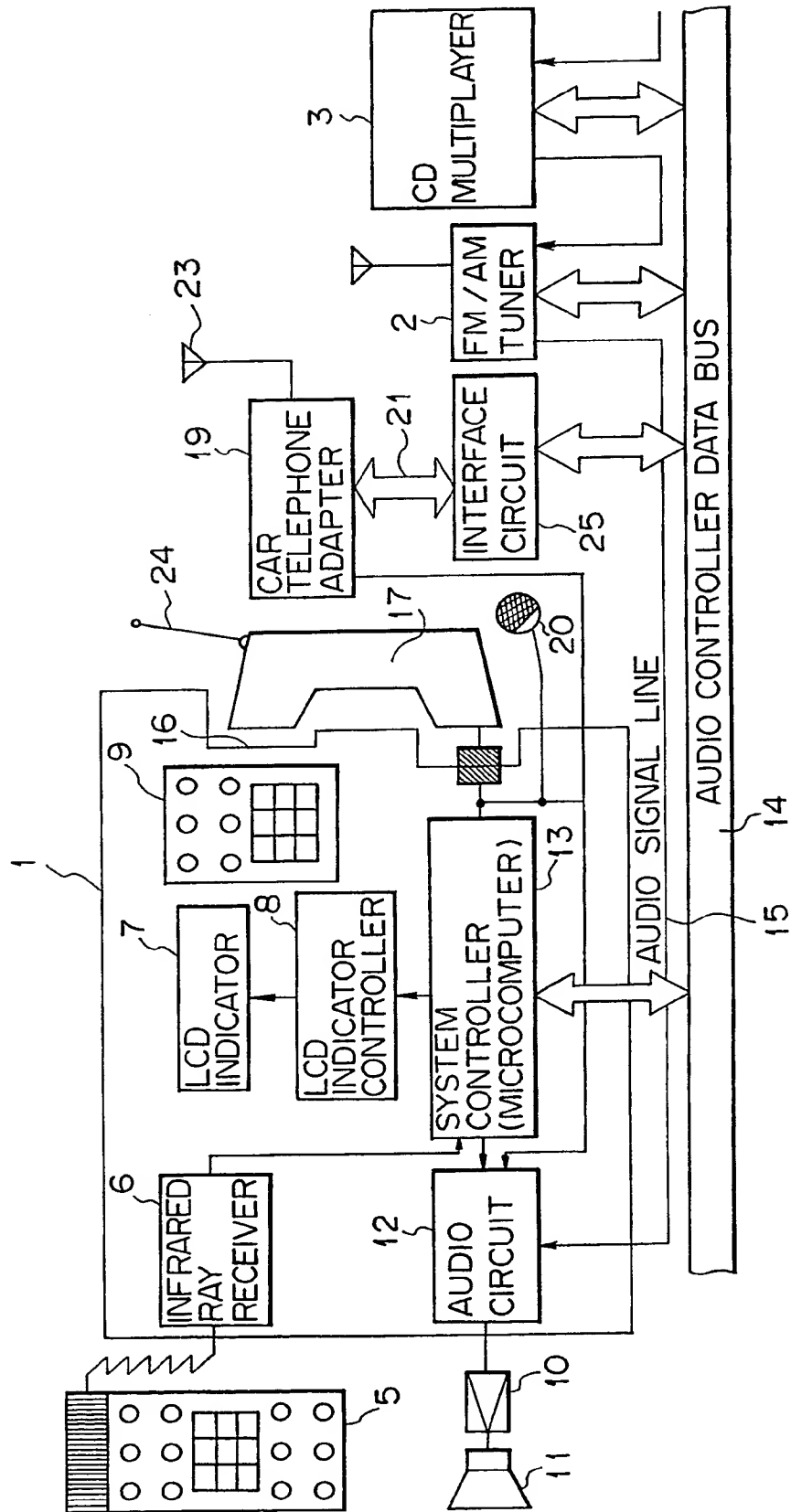
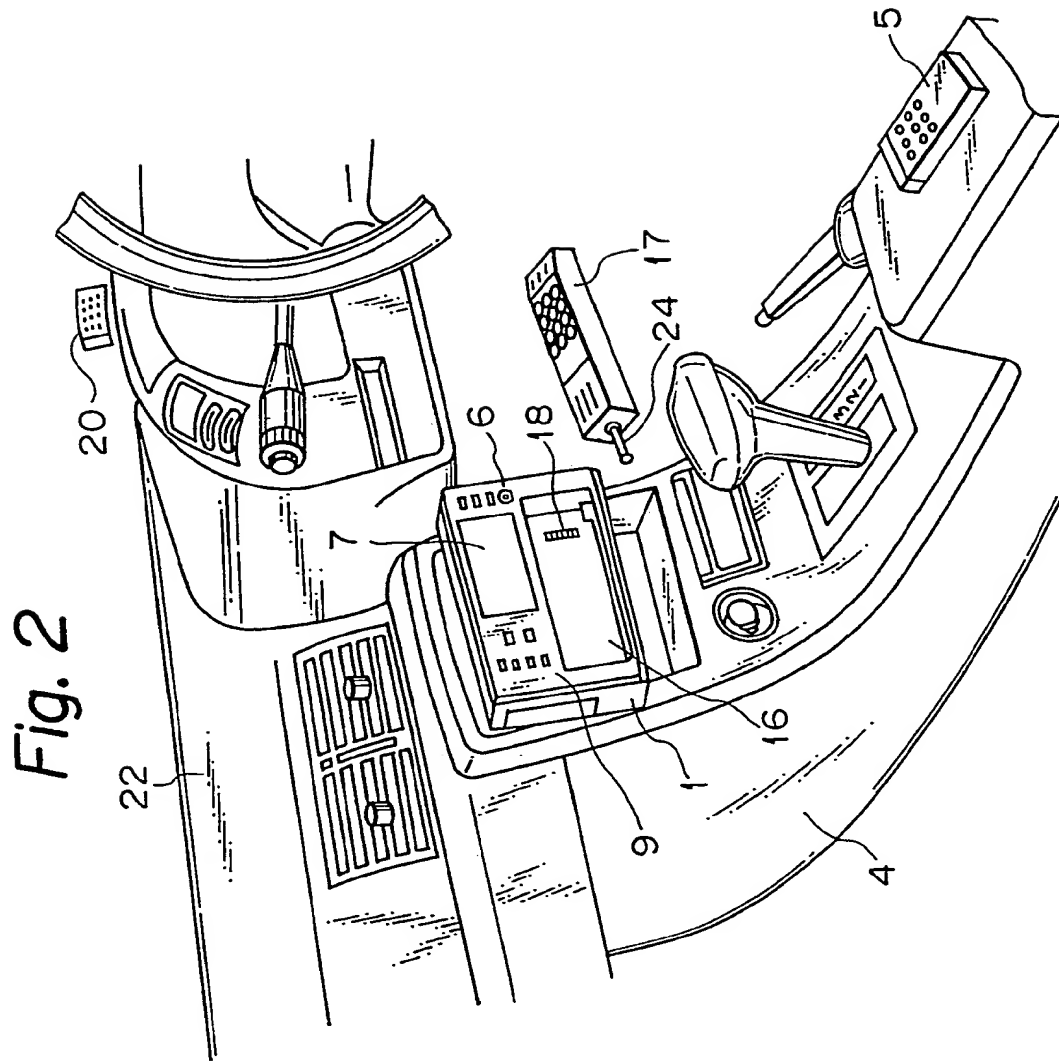


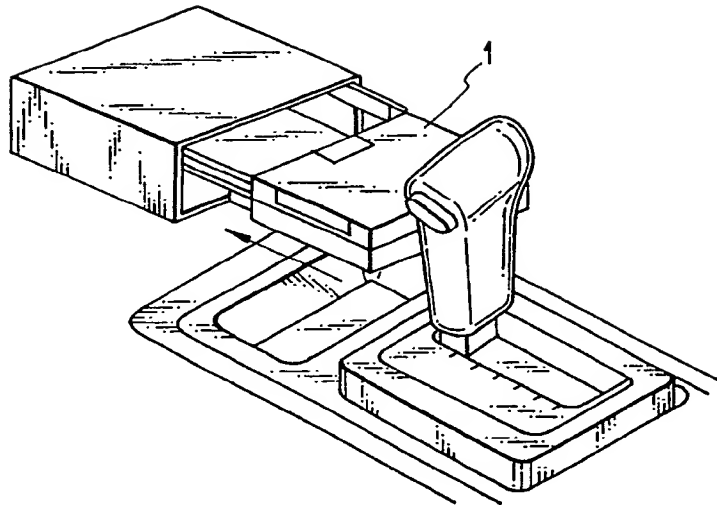


Fig. 1

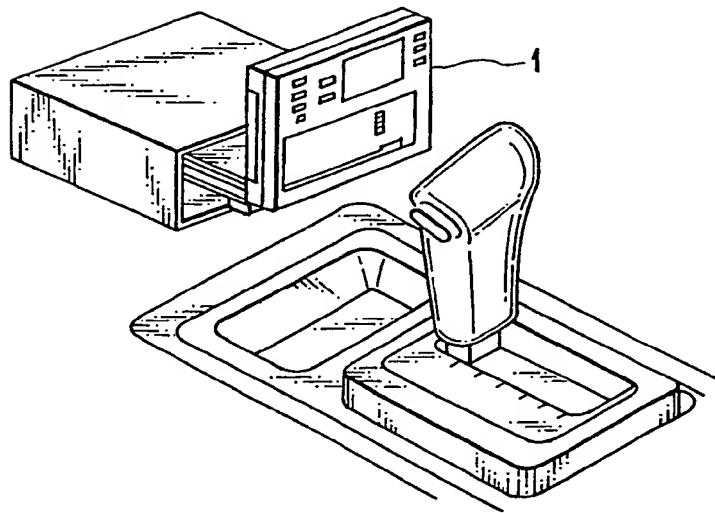




*Fig. 3A*



*Fig. 3B*



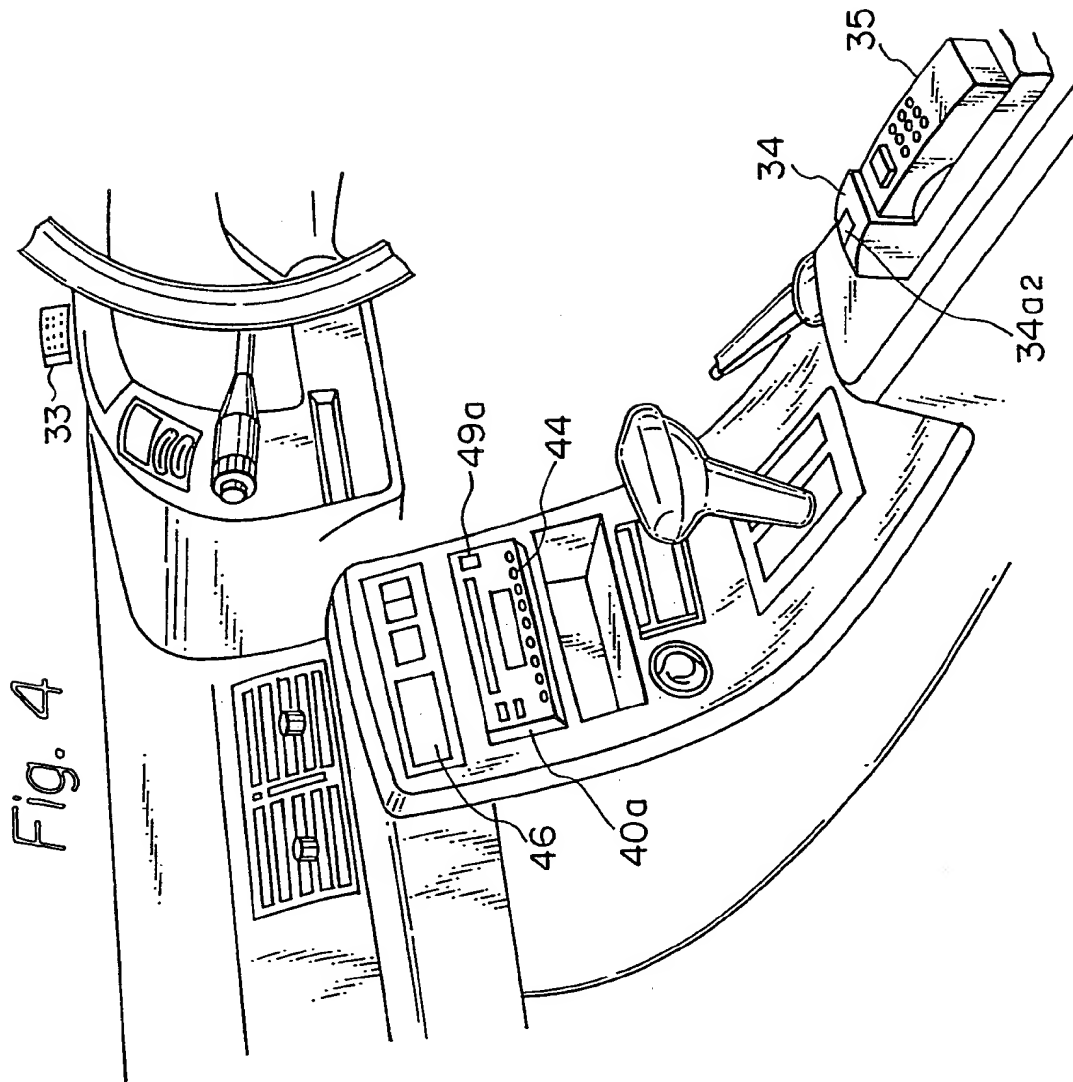


Fig. 5

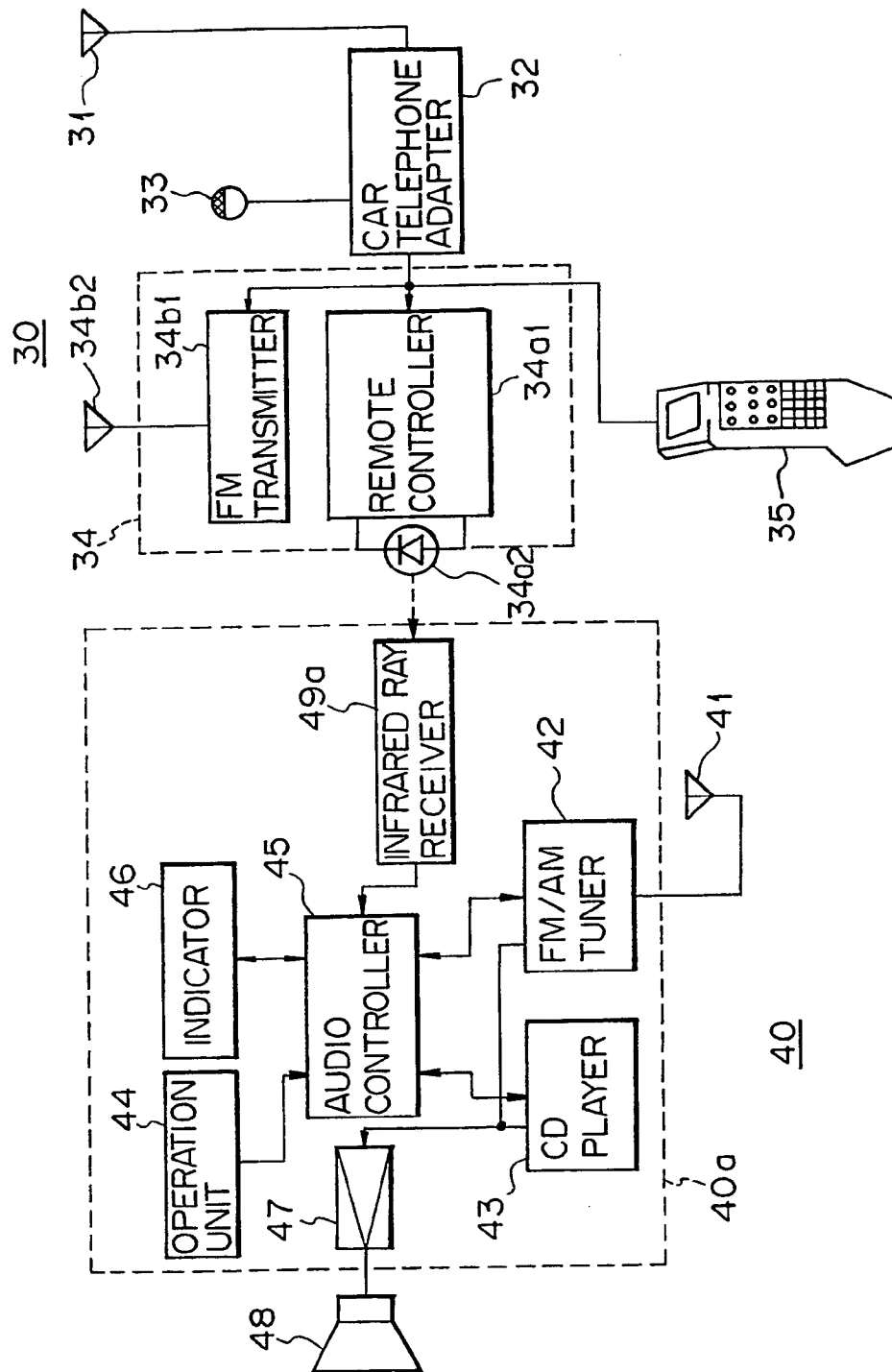


Fig. 6

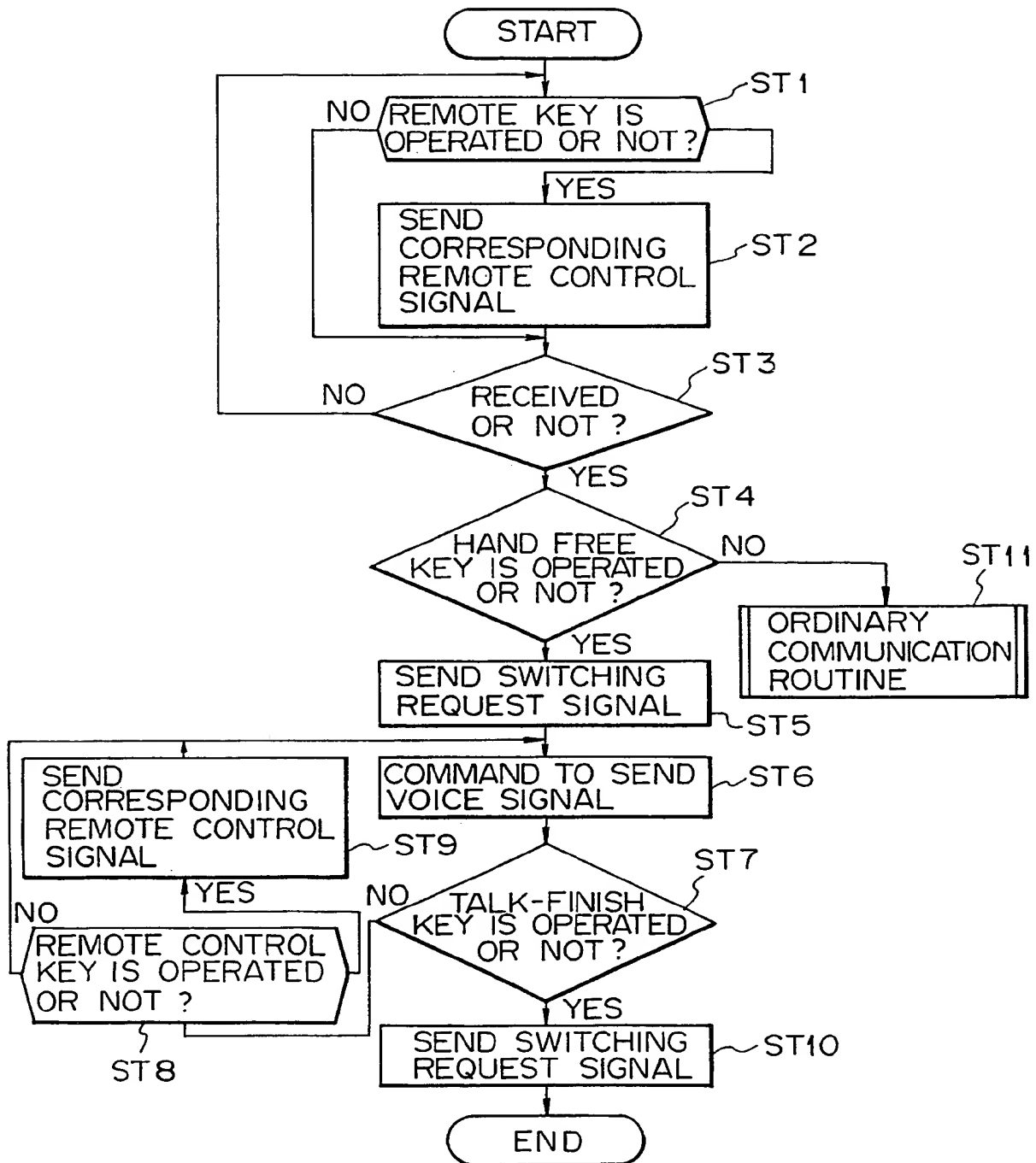
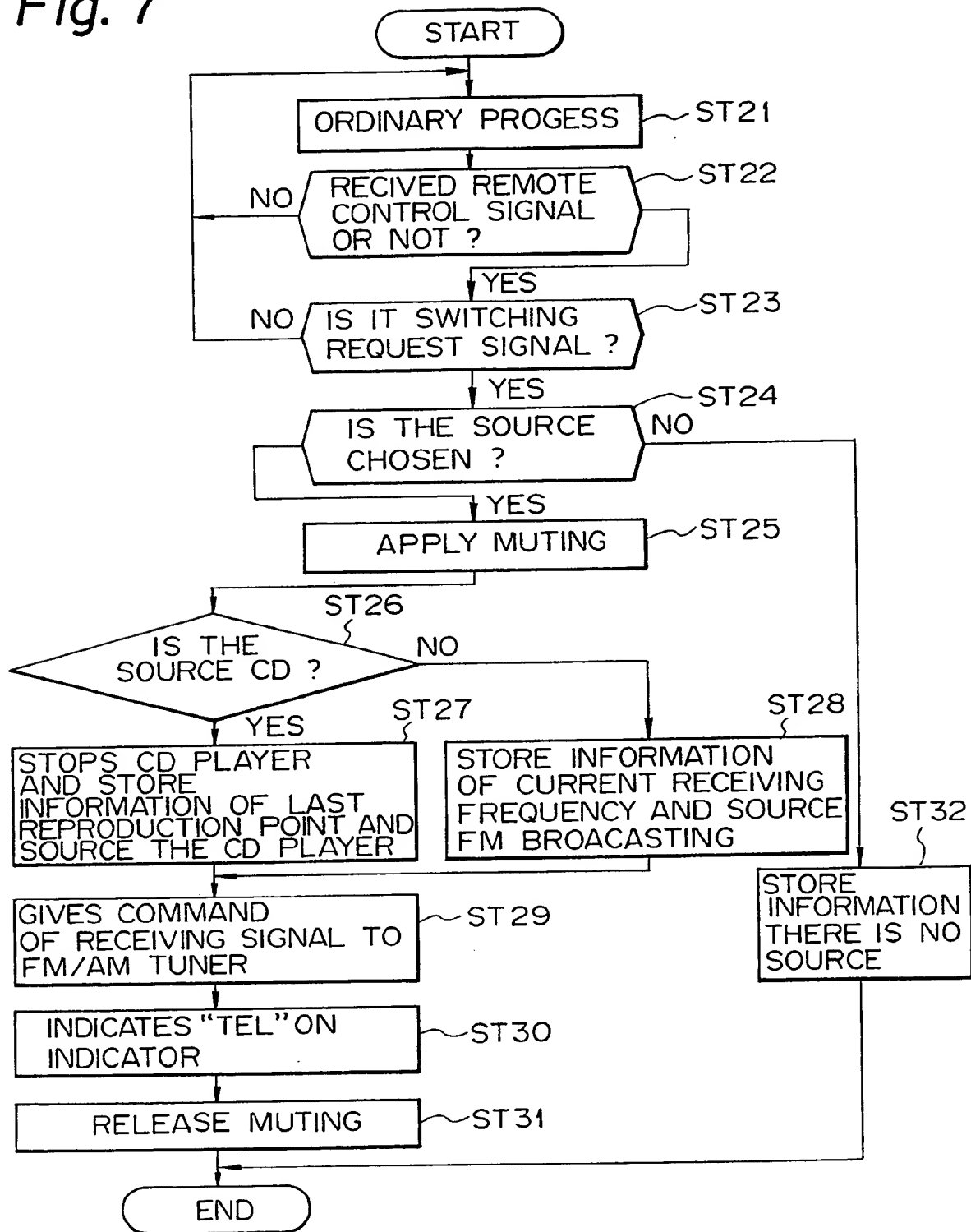


Fig. 7





8/9  
Fig. 8

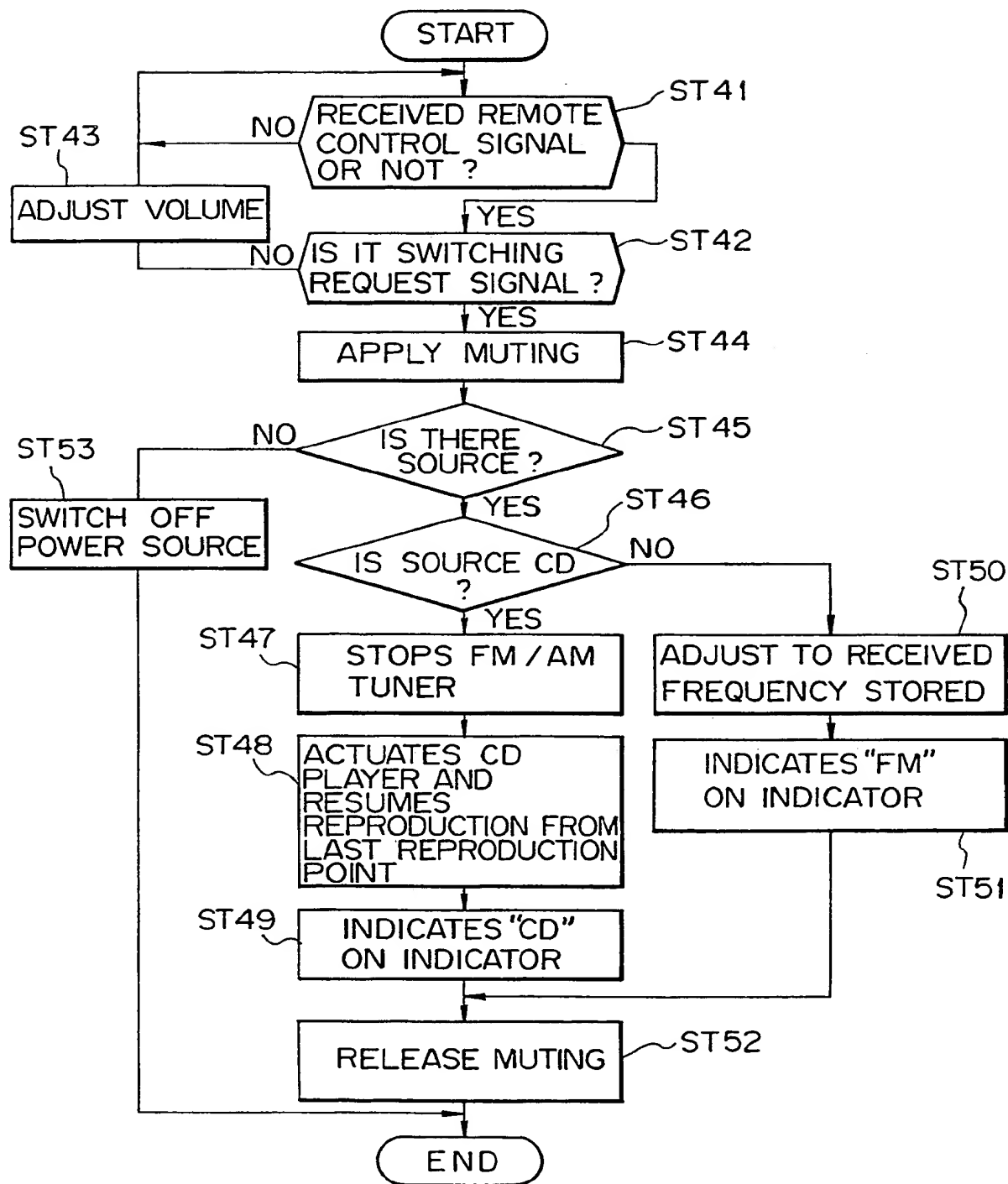
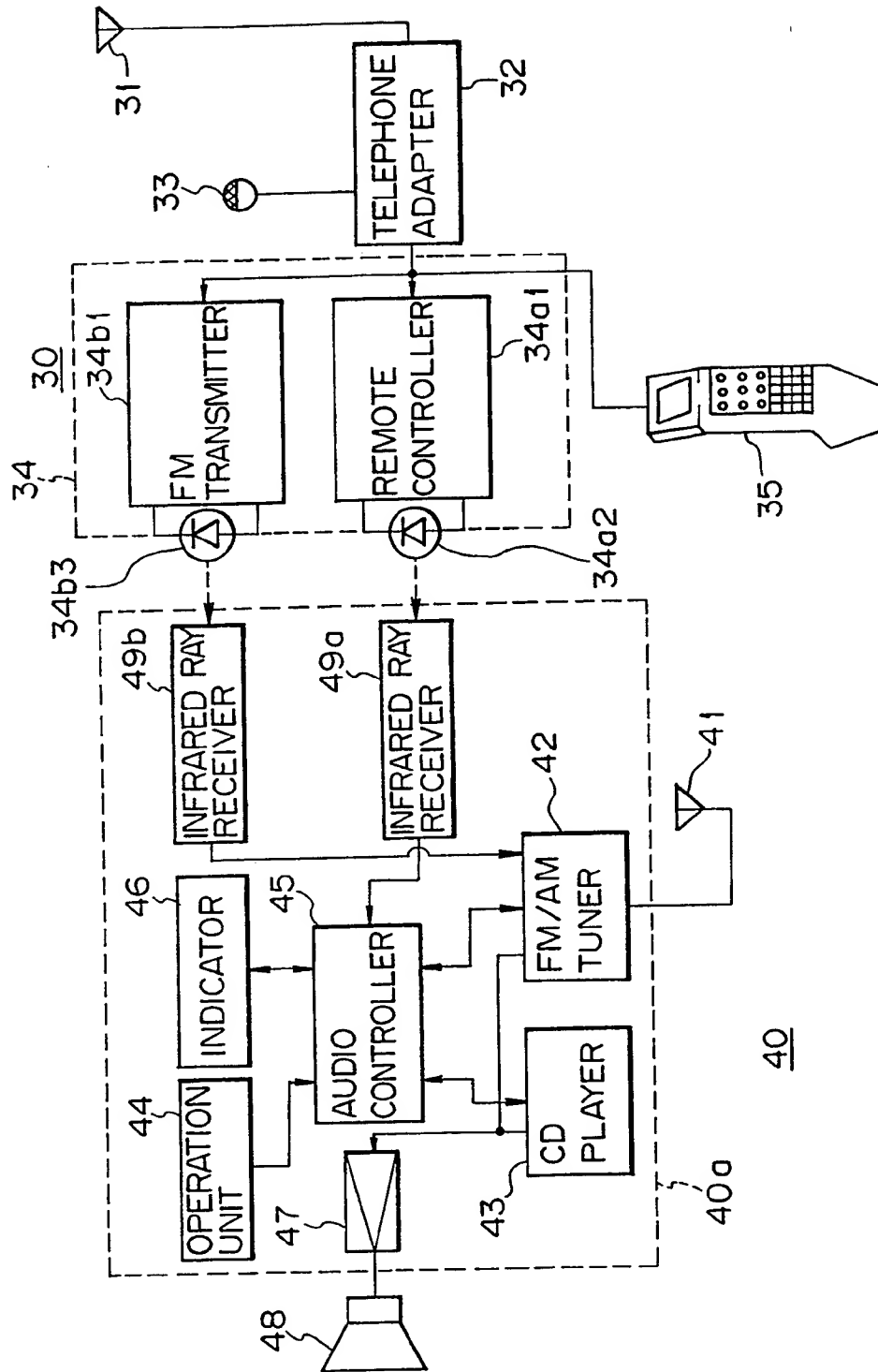


Fig. 9



## Car Telephone System

The present invention relates to a car telephone system which is to be installed in a vehicle such as a passenger car.

Since the telephone unit installed in the car telephone device is small sized, it has not usually a sufficiently display area on the telephone unit whereon call-in signal, called party number and other necessary information are indicated.

As mobile communication means, car telephone and portable telephone are popular. Regarding the car telephone, the telephone device is fixed in a console box of an automobile so as to be optionally usable inside the car. On the other hand, regarding portable telephone, it is small sized telephone which can be optionally carried in user's pocket or bag.

Regarding the conventional car telephone, it independently comprises a telephone device and installed independent of an audio device installed in the car and since it is firmly fixed in such as console box, it can not be taken out of the car, even when it is necessary. On the other hand, regarding the portable telephone, it can be carried to any place and even though it can be

carried into a car, but it is used as a telephone device independent of the audio device installed in the car.

The present invention is embodied in view of the above state of the art and purposed not only to make portable telephone to be usable as a telephone unit of car telephone, but also embodies car telephone which can visually indicates various telephonic information by utilizing the display function of a head unit for audio.

To achieve the above object, a car telephone according to the present invention is devised to comprise at least one audio source device, a head unit for audio which controls the audio source through data bus and telephone unit, said head unit having at least display means enables visual indication of audio information and holder for telephone unit which enables its removable attachment and devised to electrically connects the telephone unit and system controller in the head unit, when telephone unit is attached to said holder and devised to display telephonic information on the said display means on the head unit by transferring telephonic information which is passed through the telephone unit via interface.

The present invention provides a car telephone device which simplifies connection in its installation, i.e., does not require connectors and wiring which are

otherwise required to connect the telephone device and audio devices.

In the car telephone device according to the present invention, in case a command to read out telephone information is given to the system controller under the condition that the telephone unit is attached to the head unit holder, telephone information dispatched through the telephone unit is read out and transferred to the data bus via interface and displayed on the display means on the head unit under control of the system controller.

A car telephone device according to the present invention comprises a telephone unit, and an audio device including at least an FM tuner and an audio control unit which controls various parts unit, the hand set holder of the telephone unit being provided with remote control signal issuance means which issues a remote control signal by an infrared ray and the telephone device being provided with an FM signal issuance means which issues an audio signal by an FM wave. The audio device is provided with an, infrared ray receiver which converts the received infrared ray into a remote control signal which is to be applied to the audio control part.

Another car telephone device according to the present invention comprises a telephone unit and an audio device, each device of the telephone unit having a handset holder which is provided with remote-control

signal transmitting means for transmitting a remote-control signal of an infrared ray and with FM signal transmitting means for transmitting an audio signal of an infrared ray. The audio device includes an audio control part, a first infrared ray sensing part which converts the infrared ray from the remote-control signal transmitting means into the remote control signal to be supplied to the audio control part and a second infrared ray sensing part which converts the infrared ray from the FM signal transmitting means into an FM audio signal to be supplied to a tuner part of the audio device.

Figure 1 is a block diagram which shows a circuit arrangement of a car telephone device of the present invention.

Figure 2 shows a mounting arrangement of the car telephone device shown in Figure 1.

Figures 3A and 3B are perspective views which show the head unit of a audio device.

Figure 4 shows a mounting arrangement of another type of car telephone device according to the present invention.

Figure 5 is a block diagram of a circuit arrangement for the car telephone device shown in Figure 4.

Figures 6 to 8 are flow charts which show operations of the car telephone device shown in Figure 5.

Figure 9 is a block diagram of a still other type of car telephone device according to the present invention.

An embodiment of the present invention will be described below while referring to the accompanying drawings.

In Figure 1, a head unit 1 of an audio system controls the operations of audio sources such as an FM/AM tuner 2 and a multiloading type CD multiplayer 3 and displays various information on its displayer. As illustrated in Figure 2, the audio device is fitted in the console box 4 next to a driver's seat. The head unit 1 is devised to be housed in the console box 4, when unused, as illustrated in Figures 3A and 3B.

In this embodiment the head unit 1 comprises, a) an infrared ray receiver 6 which converts an infrared ray signal to an electric signal upon receiving the infrared ray which is transmitted from an infrared remote controller 5, b) a dot matrix type LCD (Liquid-Crystal Display) indicator 7 which indicates various information such as audio and telephonic information further description of which will be given later, c) an LCD indication controller 8 which controls indication of LCD indicator 7, d) a key board 9 which have various buttons for causing production of various control commands, e) an audio circuit 12 which has functions of switching

audio signal, volume adjustment, muting and bass/treble adjustment and produces a reproduced sound from speaker 11 through power amplifier 10, f) a system controller (microcomputer) 13 which controls operation of the whole of the audio device.

The audio sources such as FM/AM tuner 2 and CD multiplayer and the system controller 13 of said head unit 1 are connected with audio control data bus 14 and devised so that necessary data are transferred between the system controller 13 and each audio source. An audio signal which is output from each audio sources is sent to audio circuit 12 in the head unit 1 via an audio signal line 15.

The aforesaid arrangement of the audio device is not largely different from the conventional car audio device. The car telephone system according to the present invention is devised in a car equipped with such a car audio device, so that a portable telephone can be organically connected to audio device and enable the portable telephone to be usable as a car telephone without hand operation and further devised so that various telephonic information can be indicated on the LCD indicator 7 on the head unit 1.

That is to say, in the present invention, at the suitable position of the head unit 1, a telephone holder (referred to as holder hereinafter) 16 is formed which is



devised so that a portable telephone 17 as a telephone unit can be fixed removably to it and the holder 16 is provided with a required number of connector contacts 18 and when the portable telephone 17 is fitted in, contacts 18 make electric connections with the connector contacts fixed on the back of the portable telephone 17, and system controller 13 in the head unit 1 and the audio circuit 12 are electrically connected with each other.

Additionally, with the connector contact 18 of the holder 16, car telephone adapter 19 and a hand-free microphone 20 are connected. The car telephone adapter 19 is an additional circuit which enables the use of the portable telephone 17 as a car telephone. The car telephone adapter 19 contains a booster amplifier which amplifies a communication signal and a data transfer circuit which transfers telephonic information data sent by the portable telephone 17 to a telephone data transfer bus 21. This car telephone adapter 19 is suitably positioned in the console box 4 close to the driver's seat and in an instrument panel 22. The adapter 19 has a transmitting and receiving terminal which is connected to a car telephone antenna 23.

The car telephone antenna 23 may be, for instance, an antenna standing upright outside the car. This car telephone antenna 23 is used for sending and receiving the communication voice signal, in case the portable

telephone 17 is fitted in the holder 16. When, on the other hand, the portable telephone 17 is detached from the holder 16 and being used in its original way as the portable telephone, an antenna 24 fixed to the portable telephone 17 is used for sending and receiving the communication voice signal.

The antenna 24 may be such a whip antenna which is retractable in the portable telephone body.

The hand free microphone 20 is used for picking up a voice issued from the driver or user when it is set to a hand free mode and is arranged at a highly directional position such as in front of the driver's seat as illustrated in Figure 2.

A telephone audio interface circuit 25 converts a telephonic information data signal transferred from the telephone adapter 19 through a telephone data transfer bus into a data signal which conforms to the employed data format in an audio control data bus 14 and converts a control data signal to be sent to the car telephone adapter 19 from the audio control data bus into a data signal which can conforms to the employed data format of the car telephone. Additionally, a hand-free button (not shown) is arranged which enables the telephone operation mode to change to the hand-free mode, at both the infrared ray remote controller 5 and the key buttons 9 or either of them.

The head unit 1 housed in the console box 6 and for use of audio device or telephone, comes automatically or manually out of the console box by operating an open or closure button (not shown) on the head unit, as shown in Figure 3A and Figure 3B. The portable telephone 17 is usually fitted in the holder 16 of the head unit 1 and housed in the head unit 1. The following description of the operation of the head unit 1 is made under condition that the head unit is drawn out of the console box as shown in Figure 3B.

Now description about the operation of aforesaid embodiment will be given below.

Firstly, about the operation of the audio device by using the infrared ray remote controller and key buttons 9.

When, for instance, a prescribed key at the infrared rays remote controller 5 is operated, a prescribed command signal is sent to the infrared ray receiver 6 as an infrared ray signal. The infrared ray receiver 6 sends the infrared ray signal to the system controller 13 after converting it to an electric signal. The system controller 13 deciphers this received signal and sends the prescribed command signal to a prescribed audio source, for example, such as CD multiplayer 3 through the audio control data bus 14.

Through this procedure CD multiplayer 3 starts to

reproduce a designated tune in a designated CD and sends a reproduced signal to the audio circuit 12 through the audio signal line 15. After finish of the volume, bass and treble adjustments at the audio circuit 12 by operating the infrared rays controller 5, the reproduced signal is sent to the power amplifier 10 and comes out of speaker 11. The same result can be obtained by operating required button at the key board 9.

Now description about the hand-free function. In case the antenna 23 receives a telephone signal while the CD is being reproduced as aforesaid procedure, the received signal is transferred to the system controller 13 in the head unit 1 through the car telephone adapter 19. The system controller 13, when it receives this signal, switches the input signal to be dispatched to the audio circuit 12 to the car telephone adapter 19 from the CD multiplayer 3 and produce a call sound speaker 11.

A person answering the telephone in the car can answer by pushing the hand free button (not shown) on the key buttons 9 or at the infrared ray remote controller 5. Through this procedure the hand-free switching signal is sent to the system controller 13.

When the system controller 13 receives the hand-free switching signal, it perform an answering operation and switches the current communication mode to the hand-free mode and activates the hand free microphone 20. A

speaker, for instance a driver, speaks to the hand free microphone 20, it picks up the speaker's voice and sends it to the car telephone adapter 19, and after this, the voice is sent to the counterpart through the antenna 23. Voice received from the counterpart through the antenna 23 is sent to the audio circuit 12 through the car telephone adapter 19 and comes out of the speaker 11. Accordingly, the speaker in the car can communicate without touching the portable telephone 17 in such a manner that is the so-called "hand-free".

When, the operator answers by taking up the portable telephone 17 from the holder 16, the communication is done through antenna 24 of the portable telephone 17 which acts as an ordinary portable telephone and can be carried anywhere.

Now description about the display function of telephonic information displayed on the LCD indicator 7 on the head unit 1.

When, under the condition that the portable telephone 17 is fitted in the holder 16, a command to display registered telephone number stored in the portable telephone 17 is given from the infrared ray remote controller 5 or the key switches 9, the system controller 13 gives a command to the portable telephone 17 to read out the registered telephone number. The portable telephone 17 which has received the command of

reading out the number reads out the registered telephone number data stored in the contained RAM (not shown) and sends it to the car telephone adapter 19.

The car telephone adapter 19 transfers the registered telephone number data from the portable telephone 17 to a telephone/audio interface circuit 25 through a telephone data bus 21. The telephone/audio interface circuit 25 transfers the registered telephone number data to the system controller 13 through the audio control data bus 14, after converting it to a data format applicable to the audio control data bus 14. The system controller 13 sends these registered telephone number data to LCD indication controller B and the controller 8 indicates them on LCD indicator 7 by prescribed indication format (for instance, in table or itemized).

The present invention has, as described above, embodied visual indication of registered telephone numbers stored in the RAM of the portable telephone 17 on the LCD indicator 7, utilizing indication function of the head unit 1. Regarding information display, of course, it is not limited to registered telephone numbers only and can be extended to various telephonic information. Besides the aforesaid registered telephone numbers, for instance, information such as abbreviated telephone numbers and names of registered telephone number holders are considered.

Further additional and specialized embodiments of functions are possible, utilizing organic connection with said head unit 1. For instance, providing the portable telephone 17 or the head unit 1 with a voice memory, telephonic information in voice can be registered through the hand free microphone 20. Additionally, by giving a command of autodialing from the infrared ray remote controller 5 or the key buttons 9, a dial signal can be sent to the car telephone adapter 19 through the audio control data bus 14, the telephone/audio interface circuit 25 and telephone data transfer bus 21 from the head unit 1 and enables autodialing registered telephone numbers. Further additionally, indication of paging message is also possible, utilizing the data indication function of LCD.

As aforesaid description is selfexplanatory, when using the car telephone system according to the present invention, a portable telephone can be used as a car telephone and utilizing the indication functions of the head unit for audio, visual indications of various telephonic information stored in the portable telephone are possible and this embodiment makes contribution to improve the function of this type of the car telephone device.

Figure 4 shows another embodiment of the present invention. Referring to Figure 4, the microphone 13

which is arranged on the instrument panel behind the steering wheel works as a hand-free transmitter.

A hand set holder 34 is fixed rearward of the shift lever of the console box and the hand set 35 is hooked on the hand set holder 34.

At the hand set holder 34, a light emitting diode (first light emitting diode) 34a2, which sends a remote control signal by an infrared ray toward an infrared ray receiver (first infrared rays receiver) 49 located at an audio unit 2a, about which will be described later, is arranged. Front of the audio unit 2a comprises an operator 24 and an indicator 26.

Figure 5 is a block diagram showing a circuit arrangement for the car telephone device illustrated in Figure 4. The reference numerals in Fig. 5 designates elements which corresponding to the parts designated by the same or corresponding numerals in Fig. 4.

Referring to Figure 5 a telephone device 30 comprises and antenna 31, a car telephone adapter 32 which is connected to the antenna 31, a microphone 33 which is connected to the car telephone adapter 32, a hand set holder 34 which is connected to the car telephone adapter 32. A hand set 35 is mounted on the hand set holder 34 so as to take either the on-hook or off-hook condition.

The hand set holder 34 comprises a remote controller



34a1 which sends a remote control signal based on a received signal dispatched by manual operation of remote control keys arranged at the hand set 35 or based on a calling signal received by the car telephone adapter 32, a light emitting diode (first light emitting diode) 34a2 which sends an infrared ray remote control signal under control of the remote controller 34a1, and an FM transmitter 34b1 which transmit a voice signal by an FM wave via antenna 34b2 which is connected to the FM transmitter 34 b1.

At the hand set holder 34, a detecting switch (not shown) is secured which detects either on-hook or off-hook state of the hand set 35.

The remote controller 34a1 and light emitting diode 34a2 form remote control signal transmitting means and the FM transmitter 34b1 and antenna 34b2 form FM signal transmitting means. An audio device 40 comprises an antenna 41, an FM/AM tuner 42 which is connected to the antenna 41, an CD (compact disk) player 43, a key board 44 which has operation keys. An audio controller 45 controls various parts in response to signals from the FM/AM tuner 42 and the CD player 43 as well as the key board 44 or an infrared-ray receiver 49a2 which will be described hereinafter in more detail. An indicator or displayer 46 indicates various information under control of the audio controller 45. A power amplifier 47

amplifies an audio signal dispatched from the audio controller 45. A speaker 48 is connected to the power amplifier 47 and an infrared ray receiver (first infrared rays receiver) 49a which outputs signal (remote control signal) upon receiving an infrared ray from the light emitting diode 34a2.

An audio unit 40a comprises FM/AM tuner 42 through power amplifier 47 and infrared rays receiver 49a.

Operations of the arrangement mentioned above will be made hereinbelow. Firstly, the operation of the remote controller 34a1 is made while referring to Figure 6. The remote controller 34a1 detects that a remote control key (not shown) arranged at the hand set 15 is operated or not (step ST1) and in case the remote control key is operated, it actuates the light emitting diode 34a2 and causes it to transmit a corresponding remote control signal (step ST2).

After the step ST2 or in case detected the remote control key was not operated in ST1, a detection is made whether a calling signal reached or not (step ST3) and if not, return to the step ST1.

In step ST3 a detection is made that the calling signal has reached, for instance, it detects whether a hand-free key (not shown) arranged at the hand set 35 is operated or not (step ST4). If the hand free key is operated, it actuates the light emitting diode 34a2 so

that the diode 34a2 transmits a switching request signal (step ST5) and it gives the FM transmitter 34b1 a command to transmit a voice signal through antenna 34b2 (step ST6).

Following the aforesaid procedure, the remote controller 34a1 detects whether a talk-finish key (not shown) arranged at the hand set 15 is operated or not (step ST7) and if not, detects whether the remote control key is operated or not (step ST8).

When, in step ST8, a detection is made that the remote control key has been operated, it actuates the light emitting diode 34a2 and receives corresponding remote control signal (step ST9) and after that or in case step ST8 detects that the remote control key has not been operated, the step ST6 is performed.

When, in step ST7, a detection is made that the talk-finish key has been operated, the controller 34a1 actuates the light emitting diode 34a2 which transmits a switching request signal (step ST10).

When in step ST4, a detection is made that the hand free key is not operated, it proceeds with an ordinary communication routine (step ST11).

Now description about the audio controller 25 will be given below while referring to Figure 7 and 8. The audio controller firstly processes normal operations in response to the remote control signal or manual operation

of any operation key of the key board 44 (step ST21). When a remote control signal is received (step ST22), a detection is made whether the received remote control signal is the switching request signal or not (step ST23).

When, in step ST 22, a detection is made that the remote control signal is not received and step ST23 detects that the remote control signal is not the switching request signal, then proceed with step ST21.

When, in step ST23, a detection is made that the remote control signal is the switching request signal, it detects whether any source has been chosen or not (step ST24) and if chosen, it applies a muting to an audio signal to be supplied to the power amplifier 47 (step ST25) and detects whether the source is the CD player 43 or not (step ST26).

When, in step ST26, a detection is made that the selected source is the CD player 43, it causes the CD player 43 to stop and stores information of the current reproduction point and the current source information of the CD player 43 (step ST27).

When, in step ST26, a detection is made that the selected source is FM/AM tuner 42, for instance, it stores information of a currently receiving frequency of a broadcasting station (step ST28). After that or after step ST27 a command is given to the FM/AM tuner 42 to

change the current receiving frequency to a specific transmitting frequency (a frequency different from any existing broadcasting frequency) of the FM transmitter 33b1 (step ST29) and let the indicator 46 to indicate an expression of "TEL"(step ST30).

Following the above, a command is given for releasing the muting applied to the audio signal to be supplied to the power amplifier 47 (step ST31).

When, in step ST24, a detection is made that any source is not chosen, it stores information that no source is selected (step ST32).

Because of the aforesaid procedures, a voice of a calling party having reached the car telephone device is issued from the speaker 48. During communication under condition of the hand-free, the controller 45 awaits receipt of the remote control signal (step ST41) and when it receives the remote control signal, it determines whether the remote control signal is the switching request signal or not (step ST42).

When it, in Step ST42, detects that the remote control signal is not the switching request signal, it returns to step ST41, after finishing volume adjustment when it is the remote control signal which controls volume (step ST43).

When the controller 45, in step ST42, detects that the remote control signal is the switching request

signal, after applying muting to audio signal to the power amplifier 47 (step ST44), it determines, whether there is a source having been selected upon the arrival of the call from the external telephone based on the stored information (step ST45).

When it, in step ST45, detects that there is a source having been selected, it determines whether the selected source is the CD player 43 or not on the basis of the stored information (step ST46) and if it is the CD player 43, it causes the FM/AM tuner 22 (step ST47) to be OFF.

Following the above, step ST45 actuates CD player 43 and let it restart reproduction from the last reproduction point stored (step ST48) and let the indicator 46 to indicate "CD", which means the current source is the CD player 43 (step ST49).

When it, in step ST46, detects that the selected source has been FM/AM tuner 42, for instance, it causes the tuner to adjust its tuned frequency to the receiving frequency stored (step ST51) and releases the muting applied to the audio signal to be supplied to the power amplifier 47.

When it, in step ST54, detects that there has not been any selected source, it switches the power source off (step ST53).

Based on aforesaid operation and control of each

unit, the voice of the counterpart or the calling party from the external telephone is emitted from the speaker 48 of the audio device 40 and enables the hand-free communication without holding the hand set 35.

Upon finish of the telephone communication the audio device 40 automatically returns to a condition before the telephone communication, and the user can listen to the previous audio information suspended because of the telephone communication.

It is now to be noted that the power source is made ON at the step ST21 even when the power source for the audio device 40 has been OFF, i.e., any audio source has not been selected.

In case the hand set 35 is hooked off while a normal telephone communication is going on, the remote controller 34a1 dispatches attenuation signal (step ST43) and adjust the volume of the voice reproduced from the speaker 48 so that it may not interrupt communication.

Additionally, in a normal telephone communication, by manually operating the hand free key on the hand set 35, the voice of telephone communication can be emitted through the speaker 48.

As described above the present embodiments demonstrate that in installation of the telephone device 30 and audio device 40, connector is not required and hence does not necessitate wiring and simplify the

connecting process.

Figure 9 is a block diagram which shows structure of another embodiment of car telephone device of the present invention, wherein the same part illustrated in Figure 9 is designated with the same reference numerals used in Figure 5 and explanation is omitted.

Referring Figure 9, a light emitting diode (second light emitting diode) 34B3 is formed at the hand set holder 34 and connected to an FM transmitter 34b1 and converting a voice signal from the FM transmitter 34b1 an infrared ray signal representing the voice signal.

An infrared rays receiver 49b (second infrared ray receiver) in the audio unit 40 receives the infrared ray signal modulated by a pulse signal which is working as an audio signal from the light emitting diode in the telephone device 1 and demodulates it to the original pulse signal and supplies it to the audio controller 45.

The FM signal transmitting means comprises an FM signal transmitter 34b1 and a light emitting diode 34b3, and the audio unit 40a comprises the FM/AM tuner 42 through power amplifier 47 and the infrared ray receivers 49a, 49b.

In this embodiment the FM transmitter 34b1 may be a PWM transmitter which actuates the light emitting diode 34b3 so as to generate an infrared ray, power of which fluctuates in accordance with a pulse width modulation



(PWM) signal representing the voice signal.

The infrared ray receiver 49b receives the infrared ray from the light emitting diode 34b3 and converts it to an electric signal and sends it to FM/AM tuner 42. The FM/AM tuner 42 is provided with a demodulator (not shown) which demodulates supplied PWM signal and supplies the demodulated signal to the power amplifier 47.

As the embodiment described above, since the voice signal in communication is sent to the audio device 40 from telephone device 30 by an infrared ray, the modulated wave signal is not radiated out of the car and an unwanted radiation of an RF signal is avoided.

In the aforesaid embodiment, the FM signal transmitting means is installed inside of the hand set holder 34, but it is obvious that it can be also arranged at an adjacent position to the hand set holder 34.

Additionally, in the foregoing description, it was given with the example that the remote control signal and the voice information signal are dispatched from separate light emitting diode 34a2 and 34b3, but both signals can be multiplexed and dispatched from one light emitting diode. In this case either infrared rays receiver 49a or 49b may be a single infrared ray receiver.

According to the present invention at the hand set holder of the telephone device is provided a remote control signal transmitting means which transmits a

remote control signal by an infrared ray. At the telephone device is provided an FM signal transmitting means which send voice signal by FM wave. At the audio device is provided an infrared ray receiver which outputs a remote control signal to the audio controller when it receives the infrared ray which comes from the remote control signal transmitting means.

Additionally, at the hand set holder of the telephone device is provided a remote control signal transmitting means which transmits a remote control signal by an infrared ray and FM signal transmitting means which transmits a voice signal by an infrared ray. At the audio device is provided a first infrared ray receiver which outputs remote control signal to the audio controller when it receives an infrared ray which comes from the remote control signal transmitting means and a second infrared rays receiver which outputs an audio signal to the audio controller when it receives an infrared ray which comes from FM signal transmitting means.

Accordingly, the above description demonstrates that in installations of the telephone device and audio device, no connector is required for the connection of both devices and hence does not necessitate wiring and simplifies connecting process.

CLAIMS:

1. A car telephone system which comprises at least one audio source device; an audio head unit having system control means for controlling said audio source device through a data bus and display means for displaying audio information; a telephone unit; and a holder formed in a cabin of a car for detachably holding therein said telephone unit, in which,

said holder includes connecting means for electrically connecting said telephone unit and said system control means when it holds said telephone unit therein, and

said system control means includes interface means for relaying telephone information issued from said telephone unit to said data bus, so that said display means displays said telephone information.

2. A car telephone system which comprises a telephone unit, an audio device having at least an FM tuner and an audio controller for controlling said FM tuner, in which

said telephone unit includes remote control signal transmitting means for transmitting a remote control signal by means of an infrared ray, and telephone voice signal transmitting means for transmitting a telephone voice signal by means of an FM electric wave,

said audio device includes an infrared ray receiver for receiving the remote control signal from said remote

control signal transmitting means and relays said remote control signal to said audio controller.

3. A car telephone system according to claim 2, in which said remote control signal is a command signal which causes said audio controller to adjust the tuned frequency of said FM tuner to make it equal to the carrier frequency of said FM electric wave.

4. A car telephone system which comprises a telephone unit, and an audio device having at least an FM tuner and an audio controller for controlling said FM tuner, in which

said telephone unit includes remote control signal transmitting means for transmitting a remote control signal by means of an infrared ray, and telephone voice signal transmitting means for transmitting a telephone voice signal by means of an infrared ray,

said audio unit includes infrared ray receiver for receiving said remote control signal from said remote control signal transmitting means and for relaying the received remote control signal to said audio controller, and a second infrared ray receiver for receiving said telephone voice signal from said telephone voice signal transmitting means so as to reproduce said telephone voice signal.

**Patents Act 1977**

**Examiner's report to the Comptroller under  
Section 17 (The Search Report)**

- 27 -  
Application number

GB 9300832.4

**Relevant Technical fields**

(i) UK Cl (Edition L ) H4L (LDA)

(ii) Int Cl (Edition 5 ) H04B, H04Q

Search Examiner

DR E PLUMMER

**Databases (see over)**

(i) UK Patent Office

(ii) ONLINE DATABASES: WPI, CLAIMS, JAPIO

Date of Search

5 MAY 1993

Documents considered relevant following a search in respect of claims ALL

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
X	GB 2249447 A (TECHNOPHONE) - whole document	1
X	EP 0373386 A (BOSCH) & US 5086510 - eg column 5 lines 18-22 and column 12 line 53 to column 16 line 55 of US 5086510	1,2,3,4
X	EP 0272877 A2 (IBM) - eg Figures 2 and 3	1
X	DE 3726784 A (GRUNDIG) - whole document	1
X	JP 610098470 A (NEC) - whole document	1

SF2(p)

ms - doc99\fil001547

Category	Identity of document and relevant passages	Relevant to claim(s)

#### Categories of documents

X: Document indicating lack of novelty or of inventive step.

Y: Document indicating lack of inventive step if combined with one or more other documents of the same category.

A: Document indicating technological background and/or state of the art.

P: Document published on or after the declared priority date but before the filing date of the present application.

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